SCIENCE:

A WEEKLY NEWSPAPER OF ALL THE ARTS AND SCIENCES.

PUBLISHED BY

N. D. C. HODGES,

874 BROADWAY, NEW YORK.

SUBSCRIPTIONS.—United States and Canada.....$3.50 a year.
Great Britain and Europe..... 4.50 a year.

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THE DETECTION OF ARTIFICIAL (IMITATION) GEMS.

IN most works on gems much stress is laid upon "hardness" as a means of distinguishing real from artificial "stones." Having had occasion during the past two years to examine several emeralds, rubies, etc., as to their genuineness, I have come to the conclusion that this property — which is, as everyone knows, of great assistance in the determination of uncut minerals — is of very little value in the examination of cut and polished gems, inasmuch as cutting a stone renders its surface much softer — in some cases reducing the hardness by over one-tenth — so that it can be "scratched" by minerals considerably lower in the scale of hardness than itself in its natural condition. On the other hand, many artificial gems will scratch ordinary window-glass quite readily, and have a hardness nearly equal to that of quartz, although it is popularly believed that if a "diamond" scratch glass it must be real.

Polishing the surface of a stone also necessarily affects its specific gravity, especially if the specimen be of small size, as is the case with most gems. Specific gravity as a means of detecting false gems is also rendered practically valueless by reason of the fact that special care is often taken in the manufacture of these articles to make them have specific gravities as nearly like the natural species which they are intended to imitate as possible.

Gems being usually much facetted, an examination of their optical properties becomes difficult and is of very little use in their practical determination.

Many gems are thought by their owners to be genuine on account of their having been in the possession of themselves or families as heirlooms for many years. Age in this case is no criterion as to value, as it is well known that the ancient Egyptians and Greeks were well versed in the manufacture of artificial stones.

The grand and really only reliable test, it seems to me, as to the genuineness or otherwise of a gem — in case we do not wish to totally destroy the specimen — is an examination of its fusibility. Artificial diamonds, emeralds, etc., if held in the border of the flame of a spirit-lamp or Bunsen burner soon become rounded on their edges, their fusibilities being generally considerably under three, according to von Kobell's scale of the fusibilities of minerals. The real stones, diamonds, etc., with the exception of the garnet, are practically infusible.

Great care should be taken in the examination of the fusibility of a gem, as, if the latter be genuine, it may, unless heated gradually and carefully, crack and fly to pieces on exposure to a high temperature. Moreover, some gems will change color if heated too highly.

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THE SYSTEMATIC POSITION OF THE DIPTERA.

HAVING been a student of the Diptera for two years, I have come to the conclusion that the order is entitled to the distinction of being, as a whole, more highly specialized than any other. Entomologists who have attempted a general classification of insects have almost uniformly regarded the Hymenoptera as the highest order, placing the Lepidoptera second, and the Diptera third. The only exception in America, I believe, is Professor Hyatt, who, in a recent book ("Insecta," by Alpheus Hyatt and J. N. Arms), has placed the Diptera at the head of the class, with the Hymenoptera second, and the Lepidoptera third. His argument for this arrangement is brief and forcible. The main features may be summarized as follows: —

The essential question which settles the rank of any insect is, How far does it deviate in structure, and through what line of descent has it developed, from its Thysanuriform ancestors? To introduce the subject of instinct or of usefulness to man is to confuse our ideas, for we cannot translate the data furnished by such a criterion into terms of the other standard. Applying this principle, he takes the following features of Diptera to show that they possess a degree of specialization surpassing any other order: —

1. Larval structure: "The young of even the generalized forms of Diptera are, as a whole, farther removed from the Thysanuriform type than those of any other group. The secondary larval form, which in the case of the Diptera is always footless and often an almost headless maggot, has complete possession of the younger stages. As Friedrich Brauer has pointed out, the general absence in the larvæ of Diptera of the thoracic legs, even although living in situations that seem to demand their development, shows that they must have inherited this peculiarity from an ancestral form whose larva had lost them. This comparative inflexibility of the larval stage is sufficient of itself to show that there is now a wide gap between the existing Diptera and all other orders of insects, and that this chasm is not closed by the resemblances of the parts in the adult to those of the Lepidoptera or isolated forms in other orders" (pp. 273, 274).

2. The presence of but two wings: "The tendency to the enlargement of one pair of wings, like the tendency to the enlargement of certain pairs of thoracic legs and the reduction of other pairs, or a change in their structure and function, so that the insect makes a departure from the conventional normal type of four equal membranous wings and six equal-jointed legs, is everywhere an index of specialization" (p. 274).